

CLAIMS

1. III-nitride compound semiconductor light-emitting device having a plurality of III-nitride compound semiconductor layers that are epitaxially grown
5 using a substrate:

wherein the plurality of III-nitride compound semiconductor layers include an active layer generating light by recombination of electrons and holes and containing gallium and nitrogen, an n-type $\text{Al}(x)\text{In}(y)\text{Ga}(1-x-y)\text{N}$ layer epitaxially grown before the active layer is grown, and an n-type electrode
10 electrically contacting with the n-type $\text{Al}(x)\text{In}(y)\text{Ga}(1-x-y)\text{N}$ layer, and

wherein the n-type $\text{Al}(x)\text{In}(y)\text{Ga}(1-x-y)\text{N}$ layer has a surface which is exposed by etching, the exposed surface includes a region for scribing and breaking the device and a region for contact with the n-type electrode, and the surface of the region for scribing and breaking the device is roughened.
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2. The III-nitride compound semiconductor light-emitting device of claim 1,

wherein the roughened surface of the region for scribing and breaking the device is formed by dry etching.
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3. The III-nitride compound semiconductor light-emitting device of claim 2,

wherein a mask pattern is used in the dry etching.

4. The III-nitride compound semiconductor light-emitting device of claim 3,

wherein surface gratings are formed by means of the mask pattern, the surface area of each of the surface gratings is in a range of $1.5\mu\text{m}^2$ to $4\mu\text{m}^2$.

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5. The III-nitride compound semiconductor light-emitting device of claim 3,

wherein surface gratings are formed by means of the mask pattern, the height of each of the surface gratings is in a range of $0.5\mu\text{m}$ to $1.5\mu\text{m}$.

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6. The III-nitride compound semiconductor light-emitting device of claim 3,

wherein etching residues are used as the mask pattern in the dry etching.

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7. The III-nitride compound semiconductor light-emitting device of claim 6,

wherein protrusions are formed by mean of the mask pattern and each of the protrusions has a conical shape.

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8. The III-nitride compound semiconductor light-emitting device of claim 7,

wherein the diameter of the bottom of the conical shape is in the range of 1nm to 10 μ m.

9. The III-nitride compound semiconductor light-emitting device of
5 claim 7,

wherein the height of the conical shape is in the range of 1nm to 10 μ m.

10. The III-nitride compound semiconductor light-emitting device of
claim 1,

10 wherein the roughened surface of the region for scribing and breaking
the device is formed by wet etching.

11. The III-nitride compound semiconductor light-emitting device of
claim 10,

15 wherein the wet etching is a photoelectrochemical etching.

12. The III-nitride compound semiconductor light-emitting device of
claim 11,

20 wherein KOH solution is used as an etching solution in the
photoelectrochemical etching.

13. The III-nitride compound semiconductor light-emitting device of

claim 3,

wherein the dry etching is performed after the region for contact with the n-type electrode is etched.